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Pressure Cycle Calcination and Dustless Powder Transfer*

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ABSTRACT

The present method for calcining plutonium oxide is to use an open boat with a thin bed of plutonium oxide in a muffle furnace, periodically raking it to ensure oxygen contact. This process results in significant powder release and operator radiation exposure due to the lack of confinement and the need of extensive hands-on manipulation. The pressure cycled calcination process consists of a deep bed of plutonium oxide that is contained in a quartz reactor vessel. The vessel is cycled between an air or oxygen atmosphere and vacuum until calcination is complete.

To further reduce radiation exposure and powder release the Lawrence Livermore National Laboratory is developing a dustless powder transfer system. This system utilizes cyclone separator technology and vacuum to transfer plutonium oxide powder to and from the quartz calcining reactor vessel. Both the pressure cycle calcination and dustless powder transfer system have no moving parts and can be installed in existing stationary furnaces at Rocky Flats, Lawrence Livermore, and Los Alamos.

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